AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A transmitting method in an ultra-wideband communication system performing communications by sending repetitive pulse trains to a communication path, said transmitting method comprising:

assuming that m-piece pulses are transmitted per one bit of information bits ("m" is a natural number not less than 2), and that a coded rate is (k/n) ("k" is a natural number not less than 1, and "n" is a natural number not less than 2);

transforming a k-bit information bit train to (k*m)-piece pulses in total; and

transmitting sequentially the (k*m)-piece pulses to the communication path,

wherein the (k*m)-piece pulses are composed of n-piece repetitive pulse trains,

wherein the n-piece repetitive pulse trains are composed by performing, in accordance with a state of the communication path, weighting on a plurality of encoded bits, the weighting being performed such that, for each of the encoded bits, a number of repetitive pulses allotted to the encoded bit is based on the susceptibility of the encoded bit to an adverse effect including interference from another user, with an encoded bit that is susceptible to the adverse effect being allotted more repetitive pulses than an encoded bit that is not susceptible to the adverse effect, thereby adaptively adjusting the number of repetitive pulses of each of the n-piece repetitive pulse trains, and

wherein the repetitive pulse trains themselves constitute radio waves transmitted from an antenna.

2. (Currently Amended) A receiving method in an ultra-wideband communication system performing communications by sending repetitive pulse trains to a communication path, said receiving method comprising:

receiving a transmit signal as n-piece received pulse trains, the transmit signal being n-piece repetitive pulse trains transmitted after a k-bit information bit train is encoded to an n-bit encoded bit train at a coded rate of (k/n) ("k" is a natural number not less than 1, and "n" is a natural number not less than 2), and subsequently the n-bit encoded bit train is transformed to the n-piece repetitive pulse trains, wherein the n-piece repetitive pulse trains are composed by performing, in accordance with a state of the communication path, weighting on a plurality of encoded bits, the weighting being performed such that, for each of the encoded bits, a number of repetitive pulses allotted to the encoded bit is based on the susceptibility of the encoded bit to an adverse effect including interference from another user, with an encoded bit that is susceptible to the adverse effect being allotted more repetitive pulses than an encoded bit that is not susceptible to the adverse effect, thereby adaptively adjusting the number of repetitive pulses of each of the n-piece repetitive pulse trains;

outputting number of repetitive pulses composing each of the n-piece received pulse trains, based on pulse train information or bit train information received beforehand;

correlating individually pulses composing the n-piece received pulse trains with a predetermined template wave shape, thereby outputting correlation values;

integrating the correlation values as many as the number of repetitive pulses, thereby providing n-piece integrated values;

making soft decision for the n-piece received pulse trains based on the n-piece integrated values, thereby outputting the soft decision results for n bits; and

making hard decision in decoding for the n-piece received pulse trains based on the soft decision results for n bits, thereby outputting the k-bit information bit train as a decoded information signal,

wherein the repetitive pulse trains themselves constitute radio waves transmitted from an antenna.

3. (Currently Amended) A transmitting device usable in an ultra-wideband communication system performing communications by sending repetitive pulse trains to a communication path, said transmitting device comprising:

an encoder operable to encode a k-bit information bit train to an n-bit encoded bit train at a coded rate of (k/n) ("k" is a natural number not less than 1, and "n" is a natural number not less than 2), on condition that m-piece pulses are transmitted per one bit of information bits ("m" is a natural number not less than 2) and the coded rate is (k/n); and

a transmitting unit operable to generate n-piece repetitive pulse trains based on the n-bit encoded bit train encoded by said encoder, thereby transmitting sequentially the n-piece repetitive pulse trains to the communication path,

wherein pulses included in the n-piece repetitive pulse trains transmitted by said transmitting unit amount to (k*m) pieces in total,

wherein the n-piece repetitive pulse trains are composed by performing, in accordance with a state of the communication path, weighting on a plurality of encoded bits, the weighting being performed such that, for each of the encoded bits, a number of repetitive pulses allotted to the encoded bit is based on the susceptibility of the encoded bit to an adverse effect including interference from another user, with an encoded bit that is susceptible to the adverse effect being

allotted more repetitive pulses than an encoded bit that is not susceptible to the adverse effect, thereby adaptively adjusting the number of repetitive pulses of each of the n-piece repetitive pulse trains, and

wherein the repetitive pulse trains themselves constitute radio waves transmitted from an antenna.

4. (Original) The transmitting device as defined in claim 3, further comprising:

a transmitting control unit operable to generate control information on number of the repetitive pulses included in each train of the n-piece repetitive pulse trains transmitted by said transmitting unit.

5. (Original) The transmitting device as defined in claim 4, wherein said transmitting control unit is operable to acquire communication path information on the communication path, thereby generating the control information based on the acquired communication path information.

6. (Original) The transmitting device as defined in claim 4, wherein said transmitting control unit comprises:

a pulse generator operable, in accordance with the control information generated by said transmitting control unit, to repetitively generate a plurality of pulses for each encoded bit of the n-bit encoded bit train encoded by said encoder, thereby outputting the n-piece repetitive pulse trains, the plurality of pulses being predetermined according to a kind of each encoded bit.

7. (Original) The transmitting device as defined in claim 6, wherein said transmitting control unit is operable to transmit, as pulse train information, the number of repetitive pulses of the n-piece repetitive pulse trains generated by said pulse generator.

8. (Original) The transmitting device as defined in claim 4,

wherein said encoder outputs the n-bit encoded bit train in the form of an n-bit parallel format encoded bit train, and

wherein said transmitting unit comprises:

a pulse generator operable to repetitively generate a plurality of pulses for each encoded bit of the n-bit parallel format encoded bit train outputted by said encoder, thereby outputting n-piece parallel format repetitive pulse trains, the plurality of pulses being predetermined according to a kind of each encoded bit; and

a parallel-to-serial converter operable to convert the n-piece parallel format repetitive pulse trains outputted by said pulse generator to n-piece serial format repetitive pulse trains, thereby sequentially transmitting the n-piece serial format repetitive pulse trains to the communication path,

wherein said pulse generator determines, in accordance with the control information generated by said transmitting control unit, the number of each repetitive pulses composing the n-piece repetitive pulse trains, in such a manner that pulses included in the n-piece repetitive pulse trains amount to (k*m) pieces in total, and at least two pieces of the n-piece repetitive pulse trains are composed of repetitive pulses of different numbers.

9. (Original) The transmitting device as defined in claim 4,

wherein said encoder outputs the n-bit encoded bit train in the form of an n-bit serial format encoded bit train, and

wherein said transmitting unit comprises:

a serial-to-parallel converter operable to convert the n-bit serial format encoded bit train outputted by said encoder to an n-bit parallel format encoded bit train,

a pulse generator operable to repetitively generate a plurality of pulses for each encoded bit of the n-bit parallel format encoded bit train outputted by said encoder, thereby outputting n-piece parallel format repetitive pulse trains, the plurality of pulses being predetermined according to a kind of each encoded bit; and

a parallel-to-serial converter operable to convert the n-piece parallel format repetitive pulse trains outputted by said pulse generator to n-piece serial format repetitive pulse trains, thereby sequentially transmitting the n-piece serial format repetitive pulse trains to the communication path,

wherein said pulse generator determines, in accordance with the control information generated by said transmitting control unit, the number of each repetitive pulses composing the n-piece repetitive pulse trains, in such a manner that pulses included in the n-piece repetitive pulse trains amount to (k*m) pieces in total, and at least two pieces of the n-piece repetitive pulse trains are composed of repetitive pulses of different numbers.

10. (Original) The transmitting device as defined in claim 4,

wherein said transmitting unit comprises:

a bit train generator operable to repeat, for a plurality of times, each bit of the n-bit encoded bit train encoded by said encoder to generate n-piece repetitive bit trains; and

a pulse generator operable to generate a pulse for each bit of the n-piece repetitive bit trains generated by said bit train generator, the pulse being predetermined according to a kind of each bit, thereby transmitting the generated pulse to the communication path,

wherein said bit train generator determines, in accordance with the control information generated by said transmitting control unit, the number of each repetitive bits composing the n-piece repetitive bit trains, in such a manner that bits included in the n-piece repetitive bit trains amount to (k*m) pieces in total, and at least two pieces of the n-piece repetitive bit trains are composed of repetitive bits of different numbers.

11. (Original) The transmitting device as defined in claim 10, wherein said transmitting control unit is operable to transmit, as bit train information, the number of repetitive bits of the n-piece repetitive bit trains generated by said bit train generator.

12. (Currently Amended) A receiving device usable in an ultra-wideband communication system performing communications by sending repetitive pulse trains to a communication path, said receiving device comprising:

a receiving unit operable to receive a transmit signal as n-piece received repetitive pulse trains, the transmit signal being n-piece repetitive pulse trains transmitted after a k-bit information bit train is encoded to an n-bit encoded bit train at a coded rate of (k/n) ("k" is a natural number not less than 1, and "n" is a natural number not less than 2), and subsequently the n-bit encoded bit train is transformed to the n-piece repetitive pulse trains, wherein the n-piece repetitive pulse trains are composed by performing, in accordance with a state of the communication path, weighting on a plurality of encoded bits, the weighting being performed

such that, for each of the encoded bits, a number of repetitive pulses allotted to the encoded bit is based on the susceptibility of the encoded bit to an adverse effect including interference from another user, with an encoded bit that is susceptible to the adverse effect being allotted more repetitive pulses than an encoded bit that is not susceptible to the adverse effect, thereby adaptively adjusting the number of repetitive pulses of each of the n-piece repetitive pulse trains;

a pulse wave-shape correlator operable to correlate individually pulses composing the n-piece received repetitive pulse trains with a predetermined template wave shape, thereby outputting n-piece repetitive correlation value trains in correspondence with the n-piece received repetitive pulse trains;

a receiving control unit operable to output, based on pulse train information or bit train information received beforehand, n-piece repetition numbers for the n-piece repetitive correlation value trains outputted by said pulse wave-shape correlator;

an integrator operable to divide into n intervals the n-piece repetitive correlation value trains outputted by said pulse wave-shape correlator, in accordance with the n-piece repetition numbers outputted by said receiving control unit, and to integrate the n-piece repetitive correlation value trains for each divided interval, thereby outputting n-piece integrated values;

a decoder operable to make soft decision for the n-piece received repetitive pulse trains based on the n-piece integrated values outputted by said integrator, thereby outputting the soft decision results for n bits; and

a decision unit operable to make hard decision in decoding for the n-piece received pulse trains based on the soft decision results for n bits outputted by said decoder, thereby outputting the k-bit information bit train as a decoded information signal,

wherein the repetitive pulse trains themselves constitute radio waves transmitted from an antenna.

13. (Currently Amended) A transceiving device usable in an ultra-wideband communication system performing communications by sending repetitive pulse trains to a communication path, said transceiving device comprising:

an encoder operable to encode a k-bit information bit train to an n-bit encoded bit train at a coded rate of (k/n) ("k" is a natural number not less than 1, and "n" is a natural number not less than 2), on condition that m-piece pulses are transmitted per one bit of information bits ("m" is a natural number not less than 2) and the coded rate is (k/n);

a transmitting unit operable to generate n-piece repetitive pulse trains based on the n-bit encoded bit train encoded by said encoder, thereby transmitting sequentially the n-piece repetitive pulse trains to the communication path;

a transmitting control unit operable to generate control information on number of the repetitive pulses included in each train of the n-piece repetitive pulse trains transmitted by said transmitting unit;

a receiving unit operable to receive n-piece repetitive pulse trains through the communication path, as n-piece received repetitive pulse trains;

a pulse wave-shape correlator operable to correlate individually pulses composing the n-piece received repetitive pulse trains with a predetermined template wave shape, thereby outputting n-piece repetitive correlation value trains in correspondence with the n-piece received repetitive pulse trains;

a receiving control unit operable to output, based on pulse train information or bit train information received beforehand, n-piece repetition numbers for the n-piece repetitive correlation value trains outputted by said pulse wave-shape correlator;

an integrator operable to divide into n intervals the n-piece repetitive correlation value trains outputted by said pulse wave-shape correlator, in accordance with the n-piece repetition numbers outputted by said receiving control unit, and to integrate the n-piece repetitive correlation value trains for each divided interval, thereby outputting n-piece integrated values;

a decoder operable to make soft decision for the n-piece received repetitive pulse trains based on the n-piece integrated values outputted by said integrator, thereby outputting the soft decision results for n bits; and

a decision unit operable to make hard decision in decoding for the n-piece received repetitive pulse trains based on the soft decision results for n bits outputted by said decoder, thereby outputting the k-bit information bit train as a decoded information signal,

wherein pulses included in the n-piece repetitive pulse trains transmitted by said transmitting unit amount to (k*m) pieces in total, and the n-piece repetitive pulse trains are composed by performing, in accordance with a state of the communication path, weighting on a plurality of encoded bits, the weighting being performed such that, for each of the encoded bits, a number of repetitive pulses allotted to the encoded bit is based on the susceptibility of the encoded bit to an adverse effect including interference from another user, with an encoded bit that is susceptible to the adverse effect being allotted more repetitive pulses than an encoded bit that is not susceptible to the adverse effect, thereby adaptively adjusting the number of repetitive pulses of each of the n-piece repetitive pulse trains,

wherein pulses included in the n-piece received repetitive pulse trains received by said receiving unit amount to (k*m) pieces in total, and

wherein the repetitive pulse trains themselves constitute radio waves transmitted from an antenna.

14. (Currently Amended) A transmitting method in an ultra-wideband communication system performing communications by sending repetitive pulse trains to a communication path, said transmitting method comprising:

transmitting sequentially pulses composed of n-piece repetitive pulse trains to the communication path,

wherein the n-piece repetitive pulse trains are composed by performing, in accordance with a state of the communication path, weighting on a plurality of encoded bits, the weighting being performed such that, for each of the encoded bits, a number of repetitive pulses allotted to the encoded bit is based on the susceptibility of the encoded bit to an adverse effect including interference from another user, with an encoded bit that is susceptible to the adverse effect being allotted more repetitive pulses than an encoded bit that is not susceptible to the adverse effect, thereby adaptively adjusting the number of repetitive pulses of each of the n-piece repetitive pulse trains, and

wherein the repetitive pulse trains themselves constitute radio waves transmitted from an antenna.